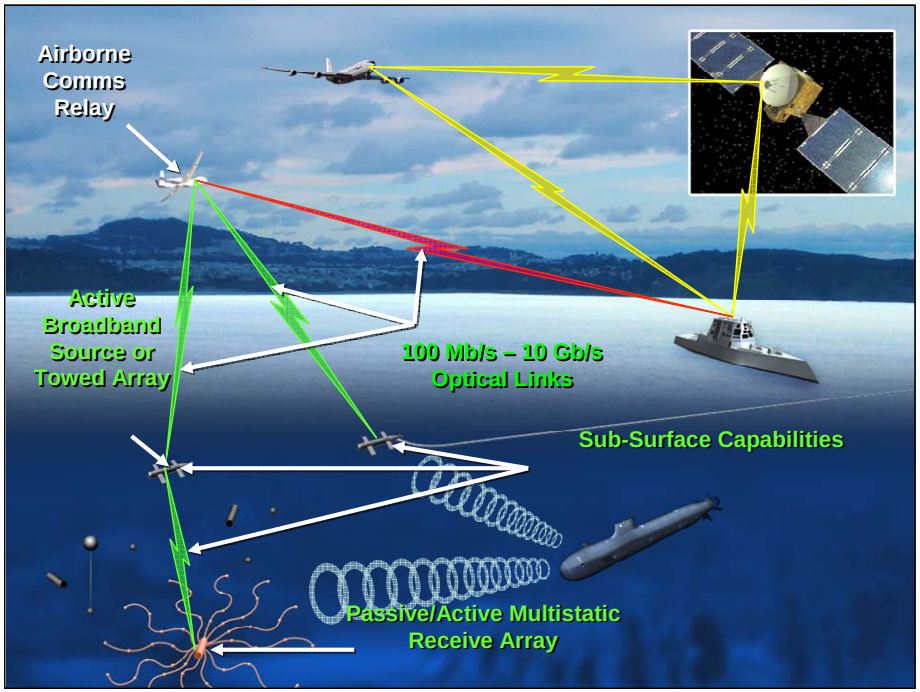
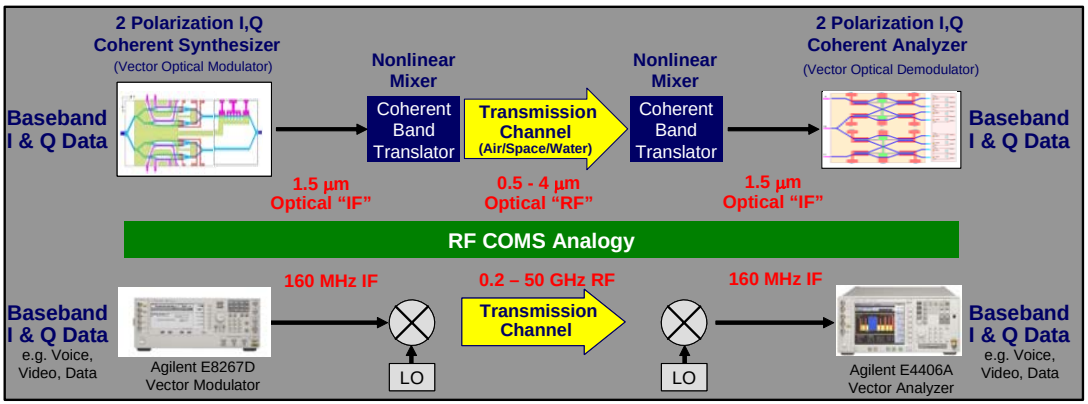
Technology for Agile Coherent Optical Transmission Architecture (TACOTA)



Optical JTRS-like Free-Space Transmission Architecture
Providing Increased Capacity, Availability & Physical Layer Security



JTRS-like High-Capacity Optical Communications Infrastructure

Technology Goal:

Develop coherent optical *SYNTHESIZER*, *ANALYZER* & *NONLINEAR MIXER* enabling:

- **>100 Gb/s capacity on single wavelength channel**
- **Multi-THz Channel BW availability (0.5-4 μm)**
- **Real-time reconfiguration**

Technology Challenges:

- **Optical wavelengths ~10,000x that of RF wavelength**
- **Up to 4 bit/sec/Hz spectral efficiency with 1 to 40 GBaud optical modems**
  - Vector modulation/demodulation; DAC & ADC
- **Parametric mixer efficiency, bandwidth & phase noise**
  - Wavelength conversion with periodically poled crystals and nano-structured based optical fibers

Phase Sensitive Wideband λ-Translation

Nano-structured Photonic Crystal Optical Fiber

Periodically-Poled $LiNbO_3$ (PPLN)